DOCUMENT RESUME

ED 348 884 FL 020 705

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TITLE Theory-Based Interactive Videodisc for EFL Learning: Design Considerations.
PUB DATE Mar 92
NOTE 31p.; Paper presented at the Annual Meeting of the Teachers of English to Speakers of Other Languages (26th, Vancouver, Canada, March 3-7, 1992).
PUB TYPE Reports - Descriptive (141) -- Information Analyses (070) -- Speeches/Conference Papers (150)

EDRS PRICE MF01/PC02 Plus Postage.
DESCRIPTORS Cognitive Processes; *Computer Assisted Instruction; *English (Second Language); Instructional Design; Instructional Materials; *Interactive Video; *Learning Theories; *Linguistic Theory; *Material Development; Program Descriptions; Second Language Learning
IDENTIFIERS *National Tsing Hua University (Taiwan)

ABSTRACT

A discussion of the design of effective instructional materials for English as a Second Language (ESL) focuses on the application of second language learning theories and concepts of instructional design from educational technology to development of interactive video. A number of second language learning models and related research are examined, including the cognitive processing, negotiated interaction, and experience models. Current language teaching practices are similarly reviewed, including communicative language teaching approaches, interactive language teaching, and applying what is known about learning strategies and styles to language teaching. Three aspects of research in the field of educational technology bearing on the discussion (the notion of inquiry leading to learning, the systems approach to instructional design, and attributes of courseware for computer-assisted instruction) are then reviewed, and the implications of theory, practice, and instructional design for interactive video are synthesized. A project at National Tsing Hua University (Taiwan) in which these findings were applied in development of ESL courseware on interactive video is then described and illustrated. Ideas for classroom use and considerations in evaluating the materials are discussed briefly. A 49-item bibliography is included. (MSE)

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Theory-Based Interactive Videodisc for EFL Learning: Design Considerations

by Hsien-Chin Liou

Paper Presented in TESOL '92, Vancouver, March 3-7, 1992

ED346884

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Theory-Based Interactive Videodisc for EFL Learning: Design Considerations[1]

Abstract

In recent years, interactive videodisc (IVD) has emerged as one of the most popular hypermedia applications in CALL. Our institute has obtained a MOE grant and launched an IVD project which aims to promote English proficiency for EFL learners. As many IVD demonstrations have shown the excitement language teachers experience and the huge array of possibilities IVD may bring in our profession, there is still not enough serious voice which addresses how IVD can be effective, especially for EFL instruction, based on theories and practices. This paper, oriented from a belief that sound grounded theoretical motivation for technological innovations should always lead CALL development, addresses the design considerations about IVD development by tailoring second language acquisition (SLA) theories and practice as well as adopting the instructional design concepts from the field of educational technology. Various SLA models such as the negotiated interaction model, the cognitive processing model, and the experience model are evaluated. Preliminary research findings about language IVD projects (e. g. Meskill, 1991b specifically regarding strategy research) will be synthesized into the design of our current project. Then, objective setting, instructional design, and on-line implementation are explained in detail. In addition, our institute's specific needs in an EFL setting are discussed. Lastly, we demonstrate how the considerations above have been implemented in our project.

I. Introduction

Computer-assisted language learning (CALL) tends to grow with technological and, to a less degree, theoretical innovations. Early in 1980s, interactive videodisc (IVD) emerged as a new star and has been attracting much attention in CALL courseware implementation. With its rapid revitalization in hardware, interactive videodisc has evolved into a mature CALL media as different platforms arose. While the technological supports grow stable and sophisticated, the majority of the IVD development, especially regarding design considerations, has not been addressed explicitly based on sound theoretical foundation.

By theoretical foundation, we are looking at both in what way interactive videodisc (IVD) develops in accordance with language learning theories and practices

[1] I would like to acknowledge Ms. Yeh Yuli and Ms. Yang Shu-Chin for their helpful comments on this paper. Our cooperative efforts in formulating this project through several meetings contribute much in shaping this paper.

and how IVD/CALL can help researchers better understand the processes of second/foreign language acquisition/learning.

This paper addresses design issues for IVD application in the CALL context (CALL/IVD) from theoretical perspectives. It evaluates second language acquisition (SLA) theoretical models and points out the model(s) which is applicable to CALL/IVD. It also briefly reviews literature of educational technology and extracts the relevance, specifically, instructional design, for CALL/IVD. Then, it reviews second language/foreign language pedagogical practices and indicates relevant applications to CALL/IVD. Lastly, this paper demonstrates an English-as-a-foreign-language (EFL) IVD project by synthesizing the theoretical underpinnings, pedagogical practices, and instructional design discussed, as well as illustrating their application to this project. Related to the demonstration are some suggested classroom activities which may make good use of CALL/IVD and proposed evaluation research we plan to assess the effectiveness of our IVD project.

II. Theoretical Underpinnings

It is well acknowledged that educational technology should assist content areas learning as its foremost goal as healthily pointed out in Doughty (1991): "It is important to recognize that language learning within the new technological environment of interactive videodisc (IVD) is primarily language learning and secondarily IVD language learning" (p. 1). Thus, an overview of theoretical underpinnings for language learning and then zooming in specific issues to be researched are the crucial initial steps before launching a CALL/IVD project. Doughty (1991) suggests two directions for which IVD designers can best code the software. The first is knowledge about SLA research, and the second is design of IVD-mediated research to contribute empirical knowledge to language learning.

A. SLA Theories and Research Findings

As second language learning is a very complex process, SLA theories have been developing in a versatile but, to a certain degree, chaotic manner. However, important SLA researchers have tried to integrate, or call for integration of the divergent theories, models, and theoretical frameworks into a coherent picture (see, for example, Hatch, Shirai, & Fantuzzi, 1990; Larsen-Freeman, 1991; Spolsky, 1988). A general picture for approaching SLA can be captured from three angles: the nativist, the environmentalist, and the interactionist (Larsen-Freeman, 1991; Doughty, 1991 and Ellis, 1986 also hold a similar view). The nativist claims that human beings are gifted with an innate language processing mechanism which can be triggered for language acquisition, given limited amount of input. The environmentalist asserts that language input is the only source for language acquisition. Early SLA theorists, influenced by the behaviorism, regarded language acquisition as product of internalization of input through imitation of stimuli, namely, language input in the SLA contexts. This line of conceptualizing was discounted since the nativist arose. However, recent interest in

input has surfaced in a different vein partly because input is observable but innate processing mechanisms are not. It is self-evident that SLA can take place only when the learner has access to input. In other words, without input, it is almost impossible for language acquisition to realize. Krashen, for example, claims that SLA takes place when learners acquire comprehensible input (1985). Larsen-Freeman creatively associates the connectionism/PDP (parallel distributed processing) with the environmentalist's views, though the association may spark controversy.

The third approach is the interactionist who puts emphasis on both the language input and the language learning environment. Input affects the learners' innate mechanisms, which, in turn, are influenced by input. An important point worth mentioning under the interactionist perspective is that the learner becomes active, who has the power of choice (Cook, 1981). Learner characteristics become an essential component to research SLA because a learner may filter or let in input, given various situational factors. It is not within the scope of this paper to discuss these views in detail; however, an overview helps to introduce and discuss the following models inspired by these perspectives.

The following three models address SLA from several of the five factors raised by Ellis (1986). Ellis, in proposing a general framework for SLA, raises the following five interrelated factors: situational factors, input, learner differences, learner processes, linguistic output (p. 16). Regarding input, he focuses on the interactionist perspective though in his summary of this area of research, he comments: "Many of these [research studies on input and interaction] ... necessitate a leap from description of input language to explanation of its effects" (p. 161). Researchers in this area have made great efforts to infer a causal relationship between input and language acquisition. For example, Long (1985) proposed the following indirect approach to demonstrate relationships between environmental features and learner language development.

> Step 1: Show that (a) linguistic/conversational adjustments promote
> (b) comprehension of input.
> Step 2: Show that (b) comprehensible input promotes (c) acquisition.
> Step 3: Deduce that (a) linguistic/conversational adjustments promote
> (c) acquisition. (p. 378)

a. The cognitive processing model. Focusing on internal mental processing, the cognitive processing theorists maintain that complex skills involve the integration of sub-skills, and sub-skills can become routinized and result in acquisition of complex skills. Within their framework, SLA is viewed as the acquisition of a complex cognitive skill. Because various components of the skill need to be practiced and integrated into fluent performance, they require the automatization of sub-skills. In addition, constant restructuring as learners simplify, unify, and gain increasing control over their second language (L2) internal representation is required when performance improves.

For the retrieval of knowledge, McLaughlin (1987) suggests another distinction--automatic vs. controlled processing. Under this view, learning at initial stages may involve the use of controlled processes with focal attention to task demands. McLaughlin's theory emphasizes controlled conscious practice at the initial stage of learning which can lead to acquisition of skills. Although he does not explicitly define the nature of practice, it seems that the kinds of practice that trigger automatization and restructuring are crucial. Citing the literature on L2 learner strategies, McLaughlin (1987) concludes that "If learning requires a constant modification of organizational structures, then it is these strategies of inferencing and hypothesis testing that govern the process of restructuring" (p. 147). Along the same line, Færch, et al. (1984) maintain that "the model we present sees foreign language learning as primarily a cognitive process of hypothesis formulation and hypothesis testing, supplemented by processes of automatization and consciousness raising" (p. 190).

Among other factors, the cognitive processing model emphasizes learners processes (how they approach the SLA tasks) and situational factors, including task characteristics which pose cognitive demand in processing/learning a language. For example, McLaughlin does not mean all SLA involves initial focal rule learning. This is one strategy; there are others depending on how the individual approaches the task of learning a second language and what the demand characteristics of the situation are. The pedagogical implications would be emphasis on to know learner strategy use and on how to optimize strategy use and training. A fruitful area of IVD research, as suggested by Doughty (1991), would be "the determination of activities or learner actions which would result in automaticized access to linguistics knowledge, controlled access to linguistic knowledge and restructured information/knowledge/or language frameworks" (p. 12).

b. The negotiated interaction model. While input is recognized as essential for language acquisition, there is little known about what nature of the input is sufficient and necessary. A well-known hypothesis, the input hypothesis (Krashen, 1985), postulates that the input which is understood for a particular learner, given his/her SLA developmental stage, leads to language acquisition. Another group of researchers claim that for input to become comprehensible is best aided when interlocutors modify their utterances during conversation in order to communicate the meaning of their messages.

Several research studies have been conducted to reveal under what conditions input can be modified to become comprehensible. In a classroom setting, Doughty and Pica (1986) summarize several research studies and suggest that a task which poses a requirement for information exchanges leads to conversational modification. Pica et. al. (1986) compared two conditions of input: simplified input without interaction vs. unaltered input with interaction. Results indicated that subjects were more successful in the interactional situation because the situation incorporated features of negotiation. They conclude that negotiation leads to comprehension. The main features of

negotiated interaction are requesting clarification, confirming understanding, and checking for comprehension. Doughty and Pica (1986) maintain that group work does not guarantee modification of interaction among the participants. It has to be carefully designed and planned to include a requirement of a two-way or multi-way exchange of information.

The pedagogical implication from this model is that learning tasks should provide chances for negotiation of meaning so that the input can become comprehensible and thus eventually acquired; one of the possible designs would be information-gap tasks which demand learners to exchange information. Research, nevertheless, is needed in order to determine which aspects of negotiated interaction are feasible and effective in the context of IVD language learning.

c. The experience model. The experience model (Hatch, Flashner, V., & Hunt, L, 1986; Hatch & Hawkins, 1987) has not yet developed as a full-fledged SLA model; however, it provides some useful insights for both language learning and IVD development. The model maintains that language learning takes place when internal mechanisms structure or restructure the data obtained from experience.

Similar to the interactionist perspective, the experience model regards interaction as a crucial element for language acquisition: "learning is guided via interaction with a 'teacher' in an associated set of experiences" (Hatch, Flashner, & Hunt, 1986, p. 20). Adapting cognitive scientists' views on mental processing such as artificial intelligence (semantic/discourse representation) and computational view of language processing, this model holds that the knowledge of language, the discourse frames or the scripts in their terms, increases in interactions which, together with knowledge acquired, cause language to develop. And the language, in turn, refines the frame, or knowledge structure.

This approach regards communication as one of the major drives for experience to restructure the knowledge of language and thus improvement in language development: "to change the knowledge structure, then, estimates of differences (how the new differs and the extent of the difference) are made. To do this, the learner must accurately abstract the 'new' from the context and recognize it as a new alternative for achieving a communicative goal" (Hatch & Hawkins, 1987, p. 255).

For pedagogical implications, the experience model suggests that we should find those experiences that contribute most to learning and work out ways to bring those experiences, and the ways of dealing with them, into the classroom. To involve the learner in discovery procedures is also recommended.

B. Language Teaching Practices

Language teaching is both a science and an art. While there are many SLA questions which are left unanswered, teaching prospers along its practical and artistic ways. Thus, language teaching practices undoubtedly provide useful insight for CALL/IVD design as IVD is one way of language teaching. There are many useful teaching approaches, methods, and techniques. For CALL/IVD, communicative

language teaching, interactive language teaching, and training of learning strategies may be valuable.

a. Communicative language teaching approaches. From the perspective of EFL learning theories and pedagogical approaches, current foreign language learning, unlike that in the 1970's, is regarded as acquisition of communicative competence of the target language (TL) -- instead of knowledge of the language alone (see for examples Brumfit & Johnson, 1979; Savignon & Berns, 1984). Language functions, speech acts, and other extralinguistic knowledge have, thus, been advocated as essential and incorporated into learning materials because communicative competence is claimed to consist of grammatical competence, sociolinguistic competence, discourse competence, and strategic competence (Savignon, 1983). Berns (1984) suggests evaluation of adequacy for communicative exercises based on the following criteria:

1. Utterances are presented with sufficient context for the interpretation of meaning.
2. The relevant contextual features are identifiable--that is, persons, objects, verbal and nonverbal behavior, and effect.
3. The insight gained into an instance of language use is generalizable--that is, the learner can make predictions/interpretations of meaning in similar situation types.
4. All three macro-functions are taken into account--that is, the ideational (conceptual), interpersonal (behavioral) and textual (formal).
5. Texts are authentic--that is, if not taken from original sources, they are believable as representations of actual use of English.
6. Options are provided for the expression and interpretation of meaning.
7. More than formulaic functions of language are illustrated.
8. The interdependency of formal and functional meaning in context is explicit as opposed to simple equivalency of form and function.

In suggesting activities that foster communicative language use, Richards and Rodgers (1986) maintain that those with three elements are useful activities: involving real communication, carrying out meaningful tasks, and engaging learners in meaningful and authentic language use. In addition, Littlewood (1981) suggests two useful activities to promote communicative language teaching/learning: task-oriented activities mediated through language and information-gap activities (producing elements of doubt in communicative process).

As for learner roles, communicative language teaching scholars believe the role of learner as negotiator between the self, the learning process, and the object of learning. A learner, thus, should contribute as much as possible so that s/he gains as much and should learn in an independent way. To sum up, a learning environment which can simulate as closely as a realistic communicative setting by furnishing multi-

channels of the TL input is claimed to be able to facilitate acquisition of communicative competence.

b. Interactive language teaching. 'Interaction' has become a buzz-word in present language classroom practice under the influence of communicative language teaching approaches. Rivers (1987), for instance, claims that interaction is the key to teaching language for communication. "Students achieve facility in *using* a language when their attention is focused on conveying and receiving authentic message. This is *interaction*. " (p. 4). Interaction involves expression and comprehension. In interactive language teaching, first comes the student characteristics: the scholastic background, age, ways of learning, objective for studying the language, and their motivation. For the genuine interaction SLA requires, teachers (as well as peer learners) must encourage and educate the learners.

In describing what happens in an interactive classroom, Rivers suggests that, among other useful points, (a) "Much listening to authentic materials with no prohibition or discouragement of spoken response or student-initiated contribution" (p. 10) appears in the class; (b) Students are engaging in joint and purposeful tasks; (c) "Students watch films and videotapes of native speakers interacting" (p. 11).

Therefore, as well known by many language teachers nowadays, creating interactive and realistic settings for verbal communication is believed to be able to result in effective language teaching/learning, and strongly recommended to be one important teachers' task in class. While the scholars in interactive language teaching do not associate themselves with communicative language teaching, their approaches to language teaching are very similar.

c. Learning strategy research/training. Recently, second language teaching practices have shifted from a concern for teaching methods to learner characteristics and their impact on SLA processes. Several learner factors such as age, aptitude, cognitive style, motivation, attitude, personality, and learning strategies have been investigated. One of the most prominent and influential research areas is learning strategy research.

Learning strategy is defined as "specific actions taken by the learner to make learning easier, faster, more enjoyable, more self-directed, more effective, and more transferrable to new situations" (Oxford, 1990, p. 8). As a learner-centered approach, the educational goal of strategy research is to foster an autonomous language learner (Wenden, 1987).

Among strategy research on various aspects of language learning tasks, two studies were conducted in CALL settings. Chapelle and Mizuno (1989) investigated how ESL students used strategies in a learner-controlled grammar lesson, motivated by the fact that few empirical data have documented students' actions in the learner-controlled CALL environment. The strategies they investigated are resourcing, practice, self-monitoring, self-management, and self-evaluation, which were operationalized as different students' on-line behaviors while using their grammar CALL lesson.

Results indicated that some students did use various on-line strategies but they did not always use the optimal strategies. They suggest that the type of data collected in this study is essential for understanding SLA and developing intelligent courseware - courseware which is sensitive to students' needs.

Following this line, Meskill (1991) implemented strategy training in a CALL/IVD conversation database lesson, and documented her observation, as she found that some learners are at a loss when it is expected that learners are effectively interacting with and ultimately acquiring language in an open-ended environment. 34 ESL college subjects were asked to use an IVD lesson with six types of advice messages implemented in the lesson: rehearse, monitor, repeat, plan, associate, and resource strategies. Another version of the IVD lesson did not incorporate strategy advice. Subjects were randomly assigned to either of the versions. On-line observation and off-line interview methods were used to collect the process data in order to answer the research questions. Results showed that most of the subjects read the advice messages and liked to follow the advice. As far as learning gain, time on task, and amount of material accessed, no significant differences were found between the advice and the non-advice groups.

Regarding implications, this study again confirms that learners vary with appropriate strategy use: good learners know what to do but weak learners need direct advice. Thus, the finding that learners seemed to have benefitted from the presence of advice messages makes further research on on-line messaging a potential consideration in CALL/IVD material development. Meskill also suggests another area for future work, advice regarding what to do with the content once accessed (reminding learners to review, etc.).

C. Educational Technology

Educational enquiry, instruction technology, and, more specifically, theories on computer-assisted instruction (CAI) courseware features disclose knowledge about learning in general. These may shed light on use of IVD for learning languages. In the following, relevant literature is reviewed.

a. Educational enquiry. Against the traditional orientation toward objectivism, constructivists maintain that: "meaning is imposed on the world by us, rather than existing in the world independently of us. There are many meanings or perspectives for any event or concept. Thus, there is not a correct meaning that we are striving for" (Duffy & Jonassen, 1991, p. 8). In their overview of that special issue devoted to constructivism, they point out the notion of an active learner. Besides, learning in context is important because it can facilitate the development of usable knowledge, if the emphasis is on generative tasks and if the enquirer is immersed in the environment. One implication from constructivism is that an individualized and self-paced learning process is essential for learners to construct their own meanings in learning. Thus, it may be inferred that a hypertext (non-linear, not imposing rigid structures in learning processes) environment is beneficial to learners.

b. The systems approach to instructional design. The systems approach to instructional design is to provide a procedural framework within which the purpose of a system (instructional activities) is specified and analyzed in order to find a good way to achieve it. One of the helpful components in the systems approach is task analysis: "the process of identifying the tasks and subtasks that must be successfully performed in order to execute properly some function or job" (Reiser, 1987, p. 22). In this decade, the concept of task analysis has been expanded to imply that tasks and subtasks form a hierarchical relationship and learners have to acquire subordinate skills before they attempt to acquire superordinate ones (Gagné, 1985). Thus, the implication may be that in language learning, certain skills at learners' early stage may require task analysis.

Derived from the behavioral science approach, Dick and Carey (1978) proposed an early systematic design for instruction. Recently, Meskill (1991a) introduces a CALL/IVD development scheme for IVD designers as summarized in Table 1, which provides a good and systematic starting point specifically for IVD development.

Table 1 Meskill's Scheme of CALL/IVD development

Phase I -- The front end
- know the medium
- identify and articulate need
- rationale for CALL/IVD
  - identify target learner
  - identify language learning needs
  - determine if the needs are met by the institute
  - state how CALL/IVD will meet all/some of the needs
  - match CALL/IVD attributes with stated needs (rationale)
- statement of goals

Determine constraints
- institutional constraints
- development constraints

Describe learner characteristics
- Do students have experience with self-directed instruction? with CAI?
- What are student attitudes toward media (eg video)?
- Are students adult (but media illiterate) or children (with commercial expectations (eg MTV)?
- What degree of need do students have for a structural learning experience?
- How much exposure to native speakers' speech/dialects do students have?

Phase II -- Analyzing the instruction system
1. select and organize content.
2. analyze enabling strategies for selected competency.
3. organize these enabling strategies hierarchically under the stated language competency.
4. determine entry level (requisite strategies) for the CALL/IVD course unit.
5. translate enabling strategies into instructional objectives, tentatively listing possible conditions and effects.

Phase III -- Design instructional strategies
- Draft system-learner dialogues: single-user, competitive pair work, group work
- Design documents
  - course outline
  - project specifications
  - production sheets
  - course map

c. CAI courseware attributes. Two important CAI courseware attributes, or coding properties are "interactivity" and "learner-control" (vs. program-control). Interactivity defined in the CALL or CAI context is "the dialogue between the learner and the system" (Meskill, 1991b, p. 277). Selnow (1988) provides critical features about interactivity: messages between the user and the system must be user-specific, response-contingent; the channel has to provide a two-way flow of information.

Borsock and Higginbotham-Wheat (1991) further provides a recipe for interactivity:

1. immediacy of response
2. non-sequential access of information
3. adaptability
4. feedback
5. options
6. bi-directional communication
7. grain-size (appropriate step size in delivery) (pp. 12-13)

Learner-control was coined by Meger & McCann (1961), meaning students' control over the sequencing of instructional objectives. Later, the concept was applied to availability of options, pace, sequence, amount of content, and direction of learning. Whether learner-control is a better strategy in CAI coding than program-control is controversial in the literature. Johnansen & Tennyson (1983), in their study, support that "providing students with advice regarding their learning needs in reference to predefined mastery criteria can indeed improve learning outcome" (p. 279). In addition, complete learner-control does not necessarily increase interactivity (Borsock & Higginbotham-Wheat, 1991).

D. A Synthesis of Implications to IVD Design

What are interacting in CALL/IVD serves well as a starting point to re-think all the theories and teaching practices above and the implications they may provide. There is a well-known technical notion of level of interactivity about use of videodisc support, which denotes the degree of control over which the contents of videodisc can be accessed during viewing. The highest level of interactivity refers to the complete control of a computer over a videodisc player. In regarding language as a communication system, we may focus on interaction between (a) verbal and non-verbal components and (b) visual and audio types of information with a CALL/IVD design. More important, we have to refer back to language learning theories to look for what interaction means when it is claimed to help learning.

We may draw several implications from the review above. First, learners become the master of their own learning. Second, communicative competence has become the accepted criterion variable in a language learning context, if not the only one. Third, input and interaction (which features negotiation) can trigger language acquisition. Under the communicative language teaching approaches, a learner is a negotiator of the language and language learning.

A multimedia CALL system such as IVD undertakes a very close simulation of an authentic and adaptive learning environment, if one can not immerse himself in an English-speaking community. An IVD environment, thus, has great potential to facilitate language acquisition. Underwood (1984) holds this position: "The combination of television-quality pictures and a full sound track provides maximum **comprehensibility of input**, plus the opportunity to incorporate authentic cultural content, to re-create, in fact, the cultural environment in which the language is spoken"

(p. 64). Doughty (1991) points out an important theoretical motivation for CALL/IVD:

> "The interactionist perspective on SLA provides a promising theoretical underpinning for research and development of IVD software for language learning. If language learning is seen as a regular and ongoing interaction between the learner's mental abilities and the linguistic environment, each contributing to language acquisition and each influencing the other, then the interaction between learner and the auditory and visual environment created in the IVD context may be hypothesized as facilitative to the second language acquisition process.
>
> Focus on input, what the learner does with the input, and how input becomes a part of the IL grammar and is ultimately revealed in the learner's output are all important research questions which could be examined in an IVD research and development program" (p. 3).

III. The EFL Interactive Videodisc Project

In the spring of 1991, the Department of Foreign Languages at National Tsing Hua University was granted by the Ministry of Education to enhance our teaching hardware. Among the plans, acquisition of two sets of IVD equipments was completed by then. Several colleagues and the author launched an IVD project to enhance the EFL teaching in the department. Due to shortage in the number of instructors, the quantity and quality of language skills courses could not meet the students' needs in our institute . Thus, the IVD project aims at assisting language skill training.

A. Design Considerations for the Project

a. Know the media. The major and first merit of an IVD system lies in the capabilities of presenting complicated types of visual information as well as presenting rich and authentic TL input for practice, far more enchanting and authentic than computerized graphic displays. Supporting general video application to language teaching, Allen (1985) maintains that video has the following strengths: (a) present realistic 'slices of life', (b) get students talking, (c) provide visual support, and (d) offer variety and entertainment. IVD also provides rich TL input. Allen (1985) summarizes as follows: (a) verbal speech, (b) non-verbal vocal items such as accent, intonation, or stress, and (c) non-verbal visual items such as gestures, facial expression, eye contact, posture, proximity, appearance, or setting. Given good design, IVD may bring learners to spend more time on task because of the variety of learner options and high-level satisfaction (Knisbacher, 1991).

b. Know the institutional needs/constraint. Though the curriculum guide set by the Ministry of Education in our country targets at content subjects such as Study of English Literature and American Literature, our learners are not prepared to pursue those courses when they are first admitted to the college. This is mainly because the six-year obligatory high-school English education has not prepared them for the

necessary language proficiency. Thus, a certain proportion of language skills such as writing and oral practice becomes a crucial part in the college curriculum. These language courses tend to aim at teaching the 'language' rather than at 'communicating.' Further, these courses follow an ordered sequence of material, which results in rare 'natural' target-language use in class. In addition, a long-standing emphasis on production skills creates a situation unlike that of an informed environment where students may be asked to utter linguistic forms that have not yet become internalized. Furthermore, the problem of large class size has troubled language instructors. In a writing class, say, 26 students' essays require many hours of grading, let alone time invested on material/class preparation. The problem is compounded by the fact that the vast majority of EFL teachers share a native language with our students, so that it is very often that English use is reserved when pace and direction of the class is not interfered.

The constraints pose a need of strengthening language skills for learners as well as the institute. More language courses should be offered; meanwhile, more native speakers' input should be provided for learners to acquire the language. The material presented in our IVD project is chosen in an attempt to provide authentic learning input for learners.

c. Know design principles. IVD can promise an authentic and adaptive learning environment by incorporating a video system into a personal computer and displaying vivid display, which is far more enchanting than texts, graphics, or animation generated on a computer monitor. However, IVD alone is not a panacea. Solid instructional design, like good lesson plans, leads to successful courseware as well as learning gains. Several aspects of launching an IVD project should be underscored: objective setting, material selection, and instructional design.

As a new delivery medium, IVD design should accommodate media-based objectives, while taking language learning theories and teaching pedagogy into account. The following is a list of possible instructional objectives in an IVD language learning aided lesson.

1. To develop reading comprehension skills with the help of viewing video
2. To develop active use of the language by learning to imitate speech acts
3. To develop speaking skills in English by imitating pronunciation, stress, and intonation as well as extralinguistic components
4. To bring the learner as closely as possible to a real conversational situation, and provide the learner with enough tools so that he or she can understand the conversation
5. To expose the learner to the culture of the language
6. To encourage students to become active listeners, guessers, predictors, and risk takers.

Regarding material selection, appropriate video contents are crucial to achieve the objectives. Ideally, the interactive video system should include various speech acts

as well as cultural facts, both in contents as well as sound, graphics, animation, video stills, and action video. Daily life situations such as going shopping, or making a phone call to apply for a job are good video materials. However, the videodisc material is, as well known by IVD developers, not easily accessible like videotapes regarding production of new video or editing of existing video. To compensate this limitation, feature films serve good language material because films themselves are communicating messages to the audience and become slices of real communication events. Use of films, however, requires intensive analysis of their contents and good adaptation to language learning.

For instructional design, the contents of video chosen ought to be analyzed to see to which extent they have included the TL items to be learned. Computer texts can include synonyms, definitions of words, explanations, similes, metaphors, and examples to help students comprehend unfamiliar TL items. On-line vocabulary and grammar references using a hypermedia format (integrated, nonlinear databases that link, annotate, and cross-reference video, animation, still images, text, music, and voice) can be designed. There are many effective teaching methods in implementing the IVD tasks. For example, the experience model can be effective when the instructional design of this IVD module adopts a simulation format for students to explore in a TL culture. For sequencing models, language learning as a unique subject field in CAI has its own subject-specific or even language-specific grading or sequencing considerations and strategies. For example, Nunan (1988) details how difficulty as a grading consideration should be determined and applied to sequencing course units. Low (1989) holds: "The [sequencing] method is based on envisaging structural possibilities in the design of a course unit and on the likely implications of specific choices that are made" (p. 153). These can be re-thought and applied in an IVD project.

B. Objective Setting

Referring to guided video use (Hadzima, 1991, p. 30), communicative language teaching (Goodman, 1984, pp. 112-113), and our own needs, the following lists **our** objectives incorporating three perspectives: **the language** (linguistic and paralinguistic aspects), **the learner** (strategy training), and **the language learning** (the negotiated interaction model).

a. The linguistic and paralinguistic features.

1. To focus on particular features of the message (linguistic features,sociolinguistic features, discourse features, strategic features)
2. To exploit paralinguistic features which differ from students' system: proxemics, gestures, facial expressions, eye contact, posture and appearance.
3. To exploit instances of turn taking and contextualized reference
4. To exploit instances of conversation management, topic avoidance,topic nomination, and clarification

b. The training of learning strategies.

(1) Direct strategies are those used in mental processing of the language (based on Oxford, 1990).

1. To increase auditory and visual memory
2. To use events in video or movie to practice schema building
3. To use comprehension questions for students to frequently and quickly verify assumptions used in schema building

(2) Indirect strategies provide support to direct language strategies (based on Oxford, 1990).

1. To learn to tolerate less than total understanding
2. To focus on self-improvement, taking the responsibility for one's work and pride in one's achievements

c. Language learning: The negotiated interaction model. The purpose is to provide students with an instrument for negotiation of meaning.

1. To watch, listen, and interpret the story by making guesses
2. To develop active listening skill by using whichever clues are available to the students
3. To seek further information by requesting confirmation of guesses.
4. To make decisions about what further information is needed.
5. To increase tolerance of ambiguity.

C. Instructional Design

We have chosen the feature film, "The Adventure of Robin Hood" in a CAV vidoedisc format for our major learning material. Several screen layouts have been designed: for the title page and main menu, see Figures 1 and 2 (in Appendix) To reach our objectives, the tentative design of the project is composed of two major modules: the presentation module and the exercise module. The presentation module introduces and demonstrates the video contents by providing options of viewing each chapter of the video contents respectively or viewing them all (see Figure 3 in Appendix for detail). Each view module contains pre-viewing activities and maximum control of the videodisc. The preview activities highlights major plots in the video by posing some questions and supplying background knowledge or hints for viewing focus. In addition, various options over the video sequencing are implemented: play, pause, video on/off, audio channel 1/audio channel 2, backward (in the videodisc), forward, on-line help, and exit options (as you can see in Figure 1). The on-line help provides cultural/background knowledge, idioms, grammar, and transcripts help levels (as you can see in Figure 2).

The exercises module currently contains comprehension checks, and scrambled scenes (where different video segments, still or motion, are scrambed and learners are asked to re-order the sequence chronologically or logically). In addition, the courseware is designed with record-keeping capacities to maintain student learning history. Currently, it records each decision in various paths while students navigating in the IVD courseware. This is to facilitate research on analysis of student learning

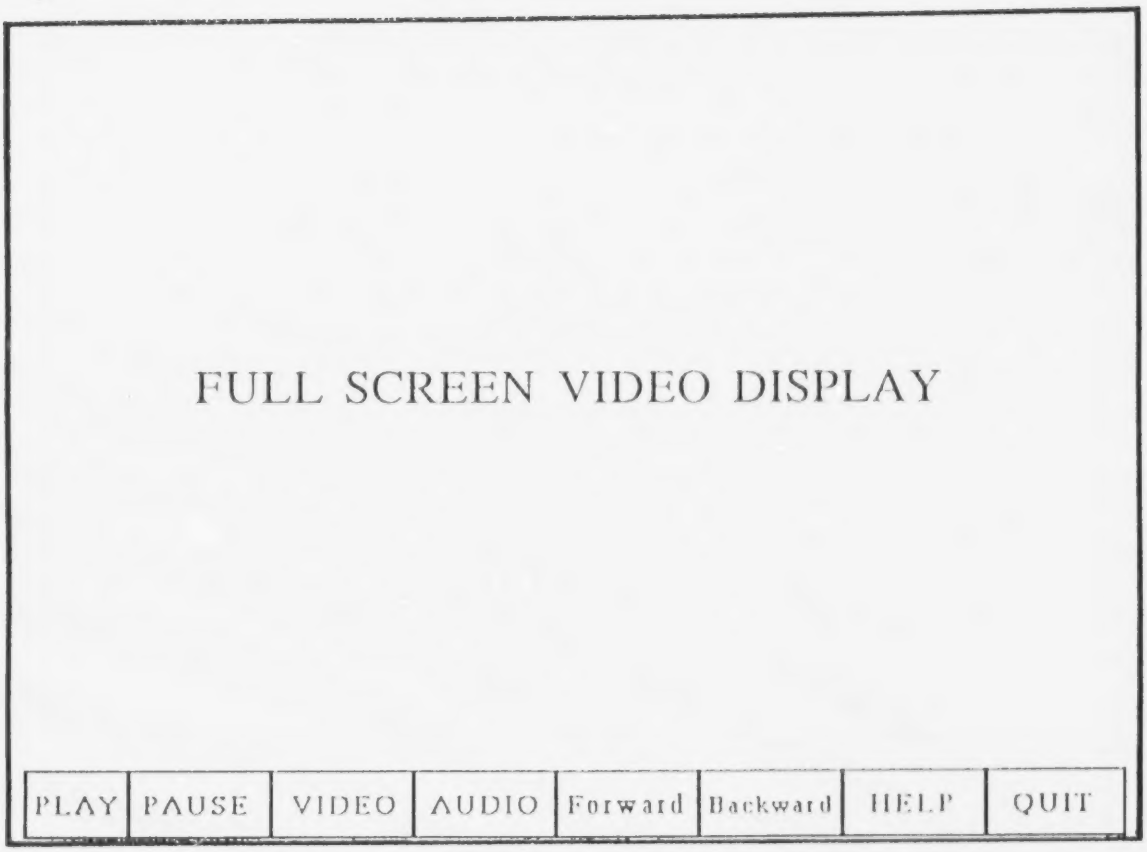

Figure 1. Full-Screen Viewing and Control Options.

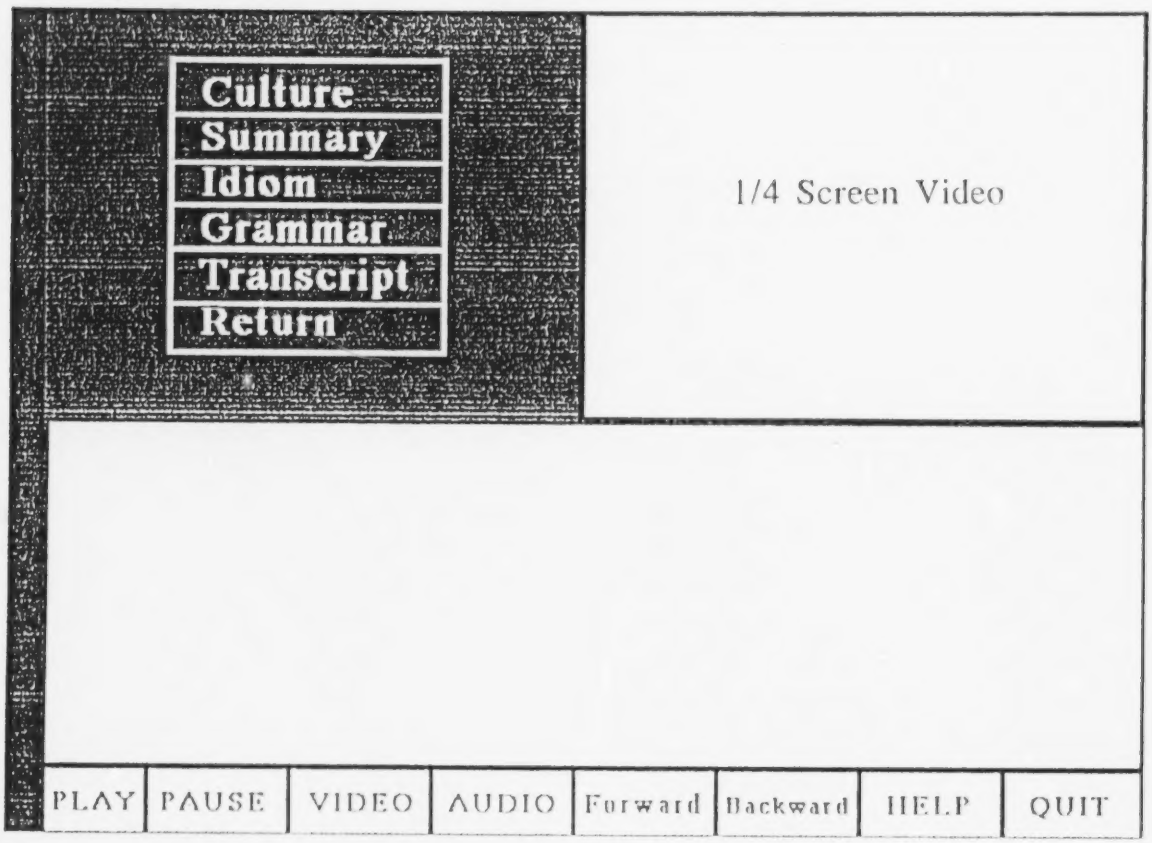

Figure 2. On-Line Help Options with One-Fourth-Screen Viewing.

styles or preferences

a. Description of the project. Adopting Chapelle's schemes (1990, Figure 7) from the perspectives of pedagogical and linguistic information, the attributes of the courseware can be described using Higgins' (1988) and Underwood's (1984) descriptors. Higgins uses the dichotomy of a magister and a pedagogue where the magister dominates the instruction and the learner, whereas the pedagogue facilitates learning by helping students. In advocating communicative CALL, Underwood lists premises of the essential elements. Table 2 uses their descriptors to characterize our courseware. Though Chapelle's discourse approach is a systematic way to describing courseware, it is not yet applicable at the current stage of our courseware development (we have not put it into use).

Table 2.
The EFL IVD Project Described in Terms of Higgins' (1988) and Underwood's (1984) Parameters (adopted from Chapelle, 1990, Figure 7)

the Parameters	**Application to the EFL IVD lesson**
Pedagogical parameters	
Magister	
Program directs students' learning	N
Program has authority to evaluate, praise, censure	N
Program structures the order of events	N
Program explains rules; gives examples	Y
Program repeats endlessly	N
Pedagogue	
Program assists students' learning	Y
Program has no authority	Y
Program provides no structure	N
Program answers students' questions	Y
Program follows students' orders	Y
Linguistic parameters	
Noncommunicative CALL	
Program incorporates grammatical sequencing	N
Program judges to inform students of their errors	N
Program is in control	N
Subject matter is irrelevant to student	N
Lesson is predetermined	N
Student perceives task as a required lesson	N
Student views task as identical to classroom activities	?
Communicative CALL	
Program does not impose grammatical sequencing	Y
Program judges more to provide helpful hints	Y
Student is in control	Y?
Student relates to subject matter in a personal way	Y
Student creates own learning experience	Y
Student perceives task as motivating supplement	?
Student views task as a novel activity	Y?

Note: ? means uncertainty of the value given; a single ? means requirement of research to verify.

We plan to make the program into two versions, one with as much learner-control as it can, and the other with strategy training by giving guided advice in both an on-line messaging format and an off-line instructional sheet for the learners while

practicing on the program.

D. Implementation

The project has been implemented in an IBM compatible platform (model 80386-33 with 4MB RAM) with a color monitor (equipped with a touch screen). The computer is connected to a Pioneer laserdisc player (LD 4200) interfaced through a live motion video controller (VMC-1 from Videomail, Inc.). The software environment requires a Microsoft Windows (version 3.0) as the preliminary interface. The authoring package we use is IconAuthor (version 3.02). The on-line programming was done by a senior undergraduate student who works eight hours a week. So far, we have completed coding of several screen designs, disc player control options, overlay of graphics and video, and on-line help capacities.

IV. Linkage to Classroom

CALL/IVD, like CAI, has its strength in individualized instruction as its design tends to adopt the merits of an adaptive system. The EFL IVD project is designed in an attempt to incorporate individual students' learning as adaptively as it can. Thus, the CALL/IVD workstations can be set up in various individual booths so that students can learn at their pace without interfering others.

CALL/IVD, however, is not necessarily used only for individual learning. Various CALL scholars have called for cooperative learning because in this way students can learn from both CALL and their peers. The social aspect of language learning under such circumstances has very constructive impact on development of communicative competence (see, for example, Abraham & Liou, 1991; Krauss, 1990).

In addition, CALL/IVD does not have to become a stand-alone activity outside of the regular classroom activities. It can serve as both pre-view and review activities in language classes such as reading, listening, speaking, and even writing when integrated into classrooms. In using CALL/IVD, students can be assisted with off-line facilities, if necessary, such as note-taking on paper or use of a dictionary. For example, a story reconstruction by means of sequence ordering features in the IVD courseware can be designed and used in the regular classroom. A group of students discuss sequence possibilities, individual students give order of scenes and the story, and when consensus is reached, a group story is created. The participants can create an additional picture for the story by making up a possible ending to the group story.

V. Evaluation Approaches

Evaluation of an instructional system in either formative or summative manner is very crucial during the development/revision stage, especially for IVD. IVD cost in hardware is high compared with common personal computer facilities; thus, its evaluation of effectiveness is essential for both teachers and administrators in terms of time/effort spent on courseware development and funds invested in its long-term development.

Early CALL/IVD research shows a partial picture of its effectiveness with sparse empirical data in English-as-a-second-language (ESL) settings. For instance,

Watts (1989) in a study on CALL use of interactive video reports that IVD provided a highly motivating and successful language learning experience, based on her research results and learner response. In a pre- post-test design of comparison between IVD groups and non-IVD groups, Probst and Bennion (1985) found that (a) both groups had increased learning in areas of **vocabulary, expressions, and content**; and (b) with the exception of expressions, in which case the IVD group did significantly better, learning gains were the same for both groups. In addition, the IVD group rated the IVD lab substantially more effective than the CAI and audio-visual labs, and showed much interest and high motivation in using the new delivery system.

While it seems simple to ask whether IVD is effective, the conclusive answer is hard to find, given a huge array of variables intervening the communication between the IVD system and the user/learner. For example, Chapelle and Jamieson (1989) suggest that aspects of **lessons, learning, and learners** should be clearly defined to make a meaningful assessment of CALL effectiveness, because "examination of a single lesson will rarely reveal that it is good for every purpose or every student" (p. 48). Thus, evaluation phases of this project target a comprehensive picture of assessment of language learning in the CALL/IVD context. As suggested in Doughty (1991), SLA theory should be underscored in implementing a CALL/IVD project; conversely, a CALL/IVD platform should serve a databank for collecting empirical data to help uncover the mysteries of language learning. The second function of the IVD use has not been emphasized before in this paper because it is appropriate to be addressed here in the evaluation/research phase. In addition to being comprehensive in collecting data in the IVD setting, the results also aim to shed light on general SLA processes.

General effectiveness research questions can be addressed in the following manner.

1. Are there particular courseware strategies better matched for a particular type of students (and thus more effective for them)?
2. In what context are there any particular manners of use of courseware better in general for learning? For instance, individual learning vs. pair/group work. And then, for what language skills is the manner more effective?

As mentioned before, this project has two versions: one with 'complete' learner control and one with strategy advice. Use of strategy advice will be one of the variables to be investigated when observing use of the courseware. In addition, background information about students will be collected to facilitate future analysis of the data. The evaluation criterion, or independent variable will be mainly communicative competence to be accompanied with other measures which are significant for a specific context. It is believed that an IVD aided instructional setting, with rich TL input and high interactivity can be designed to create an environment where language can be acquired through communicative events such as exploration or personal experiences in addition to explanation and drill. In this way, the new educational technology has tremendous potential to fulfill the goals of communicative

language teaching.

Thus, the evaluation approaches will vary according to what type of data we plan to elicit. The purpose is to find answers for a comprehensive picture about IVD use in language learning contexts. Evaluation and revision processes should go hand in hand in a spiral fashion; namely, the results of evaluation should be fed back to revision processes for further development as well as improvement.

VI. Conclusion

In this paper, various theories, of both language learning and education, and teaching practices are reviewed and evaluated to point out fruitful directions for CALL/IVD development. An attempt to apply the synthesized results to actual development of IVD courseware is demonstrated in an IVD project which aims to promote EFL learning in our institute. As the project is under way, instructional design, implemented or planned is illustrated to serve as an example in an attempt to combine theory and implementation. Hopefully this paper suggests a direction for those who will develop or use CALL/IVD material.

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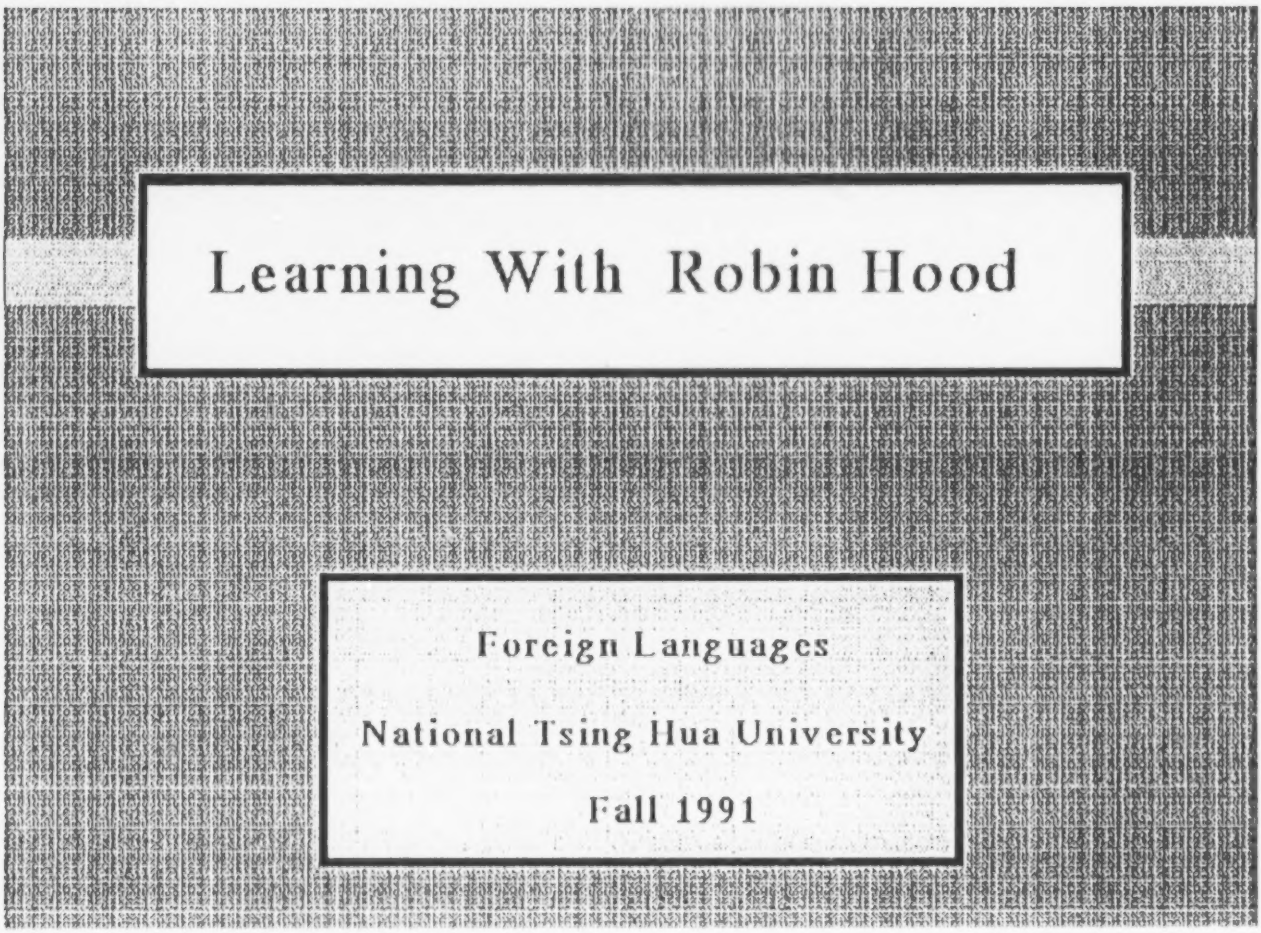

Figure 1. Titlepage of the IVD Project.

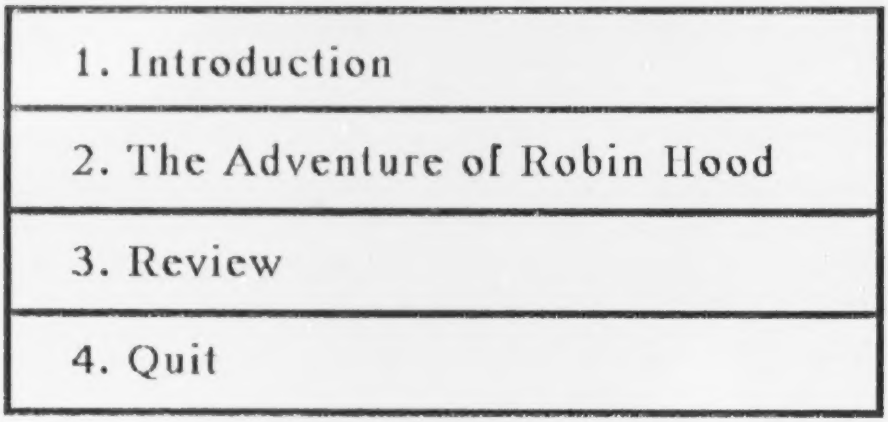

Figure 2. Main Menu.

The Adventure of Robin Hood

Chapter 1	Robin meets Friar Tuck
Chapter 2	Sir Guy's caravan ambushed
Chapter 3	Feast in the forest
Chapter 4	Robin and Marian
Chapter 5	The Sheriff has an idea
Chapter 6	The archery Tournament
Chapter 7	Robin split the arrow
	View all
	Back to main menu

Figure 3. Viewing Units and Options.